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Teaching Physics in Rural Schools: Contextualizing Scientific Content from a Rural Perspective

Teaching Physics in Rural Schools: Contextualizing Scientific Content from a Rural Perspective
Physics teaching in rural schools: contextualization of scientific contents from a rural perspective

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Abstract: This study analyzes the teaching of Physics in rural schools, highlighting the need to contextualize scientific content within the rural reality. The research adopts a qualitative approach and is conducted through a bibliographic survey in academic databases.
The results reveal that the lack of infrastructure, the use of urban materials, and poorly contextualized teacher training are some of the challenges faced. On the other hand, they show that everyday rural practices favor learning. It is concluded that it is essential to adjust teaching to the reality of the countryside so that education is more inclusive and meaningful for students.
Keywords: Physics Education; Rural Schools; Rural Knowledge; Pedagogical Practices; Contextualization of Teaching.

Abstract: This study analyzes physics teaching in rural schools, highlighting the need to contextualize scientific content to the rural reality. The research uses a qualitative approach and is carried out through a bibliographic survey of academic databases. The results reveal that a lack of infrastructure, the use of urban materials, and poorly contextualized teacher training are some of the challenges faced. On the other hand, they show that practices linked to rural daily life favor learning.
We conclude that it is essential to adjust teaching to the realities of the countryside to make education more inclusive and meaningful for students.
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1. Introduction

Teaching Physics in rural schools, considering the specific characteristics of the local context. rural life constitutes a field of reflection, practices, and differentiated approaches focused on reality in that is experienced, capable of meeting the needs and specificities of a diverse population. cultural, socio-environmental, and geographical factors. Basic education in these regions is still marked by The difference between rural and urban areas. This difference occurs due to inequality, resulting from... Lack of infrastructure, resources, and teacher training.

Due to a lack of adequate infrastructure, access to teaching and laboratory materials is limited. They become precarious. Many rural schools face difficulties in obtaining laboratories.

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adequate, in addition to the lack of specific equipment.

Furthermore, there is a lack of essential educational spaces, such as classrooms. computer labs, libraries, internet access, and adequate restrooms are lacking, which limits the... development of experimental methodologies and activities and contributes to the demotivation of students.

In this context, it is important to highlight the inadequacy in teacher training for the Contextualized teaching and the difference between traditional scientific content and everyday life. taught to students in rural areas. According to Paulo Freire (1996), teaching needs to start from The reality of the student, valuing their prior knowledge and experience. Faced with these challenges, it is It is evident that there is a need to rethink how physics is taught, making it more meaningful. accessible and adapted to reality.

People in rural areas have a right to an education designed from their own perspective, from their own context. participation and their culture, as well as their human and social needs. According As highlighted by Miguel Arroyo (2007) and Mônica Molina (2012), Rural Education should value the subjects, their territories, and their ways of life. Often, schools located in rural areas They maintain ties with communities that preserve the natural environment. Riverside dwellers, Extractive workers, farmers, and traditional peoples have daily contact with physical phenomena that, if When approached in a pedagogical way, they can serve as learning tools.

In this environment, Physics ceases to be merely complex and abstract and becomes more connected to the lifestyles and practices of the workers. According to Demétrio Delizoicov et al. (2002), science education should promote the connection between scientific knowledge and The social reality of the students. The rural area has its own richness and complexity, offering a more accessible environment for a pedagogical reconstruction focused on everyday life.

Currently, rural residents still do not receive a fully adapted education. to its reality. Caldart (2020) states that rural education has historically suffered from transposition of the urban curriculum, which disregards peasant ways of life, work, and culture. Traditional scientific content is geared towards the reality of "city people". Examples of physical experiences include the speed of cars, trains, airplanes, buses, skateboards, etc. commonly used in textbooks. Students living in rural areas will have greater difficulty in They cannot understand examples of this nature, as they are not part of their reality.

The reality of rural residents is deeply connected to nature and the cycle of rural life. All the physical phenomena present in this environment, such as the climate, the soil, the crops, animals, boats, canoes, river droughts, fishing, and the changing seasons. They are connected to the culture, experiences, and daily lives of these people and are observed and

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experienced daily.

Therefore, bringing the teaching of Physics in the field from a rural perspective is not...
It is limited to a curricular adaptation of urban content, but implies understanding that a
Education should engage with the students' perspectives, broaden their worldview, and ensure...
The right to quality learning.

2. Theoretical Framework / Results

The teaching of Physics in rural schools: "Rural Education still faces several challenges."
challenges related to the structural conditions of schools, teacher training, and construction
of pedagogical practices that engage with the reality of rural communities." (ANTUNES-
ROCHA; ALVES; HUNZIKER, 2023).

Through education for all, rural education is not outside this framework; it
It needs to be aligned with the students' life reality, with adequate training for them.
teachers and the use of teaching materials geared towards the students' reality. Being
Thus, in this context, Brazilian educational legislation recognizes the peculiarities of education.
rural, establishing:

In providing basic education to the rural population, the education systems will promote the
adaptations necessary to the peculiarities of rural life and each region, especially regarding:

I – to curricular content and methodologies appropriate to the real needs and interests of
students from rural areas;
II – to the school's own organization;
III – to adapt the school calendar to the phases of the agricultural cycle (BRAZIL, 1996, art. 28).

Can a student from a rural area have a textbook aimed at students who live there?
in " city " The reality of life is completely different; therefore, an update of these...
Teaching resources are needed to facilitate student learning in the field.

As discussed by Molina and Jesus (2004), the use of standardized teaching materials,
Designed for the realities of the urban context, this creates difficulties in building an education for
A field that is familiar with the social, cultural, and productive realities of rural communities.

Therefore, a recent study that served as inspiration for writing this article has...
Seeking to bring Physics teaching closer to the social practices of the field, the following article, "The production
Networking in artisanal research as a structuring knowledge for teaching physics in schools – a dialogue of
knowledge in the PIBID rural education program at UFPR Litoral", by Melzer, Haluch and Camilo (2020), in which

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A practical project was produced and developed with high school students.
elementary and high school students, PIBID scholarship recipients, teachers, and the local fishing community.
The topics covered specifically included the concepts of force, tension, and strength of materials.
and Newton's laws. These concepts were explored in a contextualized way through...
production of a handmade fishing net.

According to Ausubel, in his theory of meaningful learning, knowledge is...
It becomes more practical when related to students' prior knowledge, which reinforces the approaches.
and the importance of engaging with the daily lives of students in rural areas.

According to educational indicators that point to the specific challenges faced
by young people in rural areas of Brazil. According to the National Institute of Studies and Research
Educational studies by Anísio Teixeira (INEP, 2025), the reconciliation between studies and resistance is a
This is a problem for young people living in rural areas of Brazil. The population between the ages of 15 and 17, who
This totals 2.2 million people: 34% of young people do not attend school, and among those who do...
Of those enrolled, only 12.9% are in high school, the appropriate level for their age. This reinforces the
There is an urgent need for educational practices that engage with rural realities.

This article presented a form of teaching geared towards the field, a teaching method.
from their rural reality, from the social interactions with which they are familiar, and, with that, it makes the
teaching physics in a way that can be better interpreted and visualized by these students, making
The most accessible and practical education.

Given this, it becomes evident that there is a need to rethink how physics is taught.
taught in rural schools, in a way that goes beyond the mere reproduction of urban content.
and become effective by relating to the reality, culture, and knowledge of rural communities.

The education that is imposed on those who are truly committed to liberation is not...
It can be based on an understanding of men as empty beings whom the world 'fills' with
contents. On the contrary, it must start from men as beings who make and remake themselves in praxis,
in action and reflection on the world. Only in this way does knowledge cease to be an act of mere deposit.
and becomes an act of creation, in which educator and learner mutually constitute each other as
subjects of the educational process. (FREIRE, 1987, p. 67).

The scientific contextualization imposed by values and practice contributes in a way
significant in making this learning more critical and relevant, by bringing new ways of thinking.
By integrating physics into rural experiences, physics education assumes responsibility for education.
from the countryside, strengthening the culture, rural knowledge and identity of the rural people, promoting,
Thus, a fairer education for all, without inequality, and indeed inclusive.

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2. Material and Method

This work was developed during the course offered in the program of Bachelor's degree in Physics, in the 6th semester, from the Federal Institute of Amapá - IFAP, of which the authors are a part. They are part of it. The work began as part of the course "Research in Physics Teaching," which It fostered interest and provided encouragement for the initiation of this work.

From this perspective, the initial proposal of the article was focused on the teaching of physics in... riverside schools. However, due to a scarcity of materials addressing the desired topic, she It was changed to a more comprehensive version, without straying from the initial idea, resulting in "The Teaching of Physics". For Rural Schools: Contextualizing scientific content from a rural perspective.

The research is characterized by a qualitative approach; articles from [source] were analyzed. field. Initially, the research was being conducted by the Professional Master's Program Portal in Physics Teaching (MNPEF); however, there were great difficulties in finding articles that correspond to the theme, even changing the research method to "Physics in the field," "Physics for "The riverine communities", "Physics in rural areas", "Physics on the Amazon River", among other forms of Search modification on the portal.

Given the lack of articles related to what they were looking for, the research took the... redirection to the Capes Periodicals Portal, which offered greater accessibility to The number of articles related to the desired topic and context. Initially, the Portal used... The keywords, combined in different ways that alluded to the research topic, such as: Teaching of Physics and Rural Schools. Articles were chosen that were open access, peer-reviewed, and of... national production.

In the exclusion and inclusion criteria, articles that discuss the teaching of were included. Physics in rural education and are available for reading (open access), and those that were excluded were excluded. They had no bearing on the topic and were unavailable for reading (closed). The period It was not defined.

This entire process resulted in the creation of a spreadsheet where the collected data was extracted. of the articles, such as the authors' names, year of publication, theme, and stated objectives of each. article, abstract, keywords, methodology, context (school, grade level, adult education, laboratory, etc.), Educational product or not, main findings in the article, connection to the theme (central/secondary) and finally the complete description of the article. With this systematization, she provided a better comparative analysis of the main contributions of the studies and the existing gaps in the teaching of Physics geared towards rural schools.

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3. Results and Discussion

With the analysis of the selected articles organized in the extraction model spreadsheet, Several current trends were identified in research on physics education focused on for rural schools. In general, studies show that a lack of meaningful pedagogical practices that engage with the sociocultural reality of the students that They live in rural areas (ANTUNES-ROCHA; ALVES; HUNZIKER, 2023). This propensity was observed in the analyzed articles, which highlight the absence of pedagogical strategies. contextualized as the main obstacle to teaching physics in rural areas.

The results obtained indicate that a large part of the research aims to contextualize the scientific content based on the students' experiences in the field. In this context, many of the Physics concepts continue to be taught in the classroom using urban examples, which These issues predominate in textbooks, making it difficult for students to understand the subject. who have no contact with these situations. In the studies highlighted, the predominance of approaches focused on the urban context, especially in the use of textbooks, in which, when At the same time, the authors emphasize the need to bring scientific content into lived experience. the students (MOLINA; JESUS, 2004). This observation is consistent with what Molina and Jesus discuss. (2004), when stating that the use of standardized teaching materials, mostly Designed for the urban context, it tends to distance the teaching process from social reality and cultural practices of rural communities.

Another important point highlighted in the studies analyzed is the training of teachers for the role. in rural schools. Many studies indicate that continuing and initial teacher training Discussions about the peculiarities and specific situations of education are not always beneficial. in the field (CALDART, 2020). This issue is also present in the articles analyzed, in which The authors highlight how training is weakened in terms of addressing specificities. of Rural Education, even more so with the valorization of local knowledge and the contextualization of scientific content.

This context contributes to the reproduction of pedagogical practices based on urban curricula, disregarding the local experiences and knowledge lived by the students. Thus, Antunes-Rocha, Alves and Hunziker (2023) emphasize that rural education still faces challenges both in building pedagogical practices that value specificities and in school's structural conditions.

Therefore, the analysis of the articles showed that the initiatives that seek to bring closer The teaching of Physics in the context of social practices has shown positive results in the development of

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learning. One example is the study developed by Melzer, Haluch and Camilo (2020), which
He used the artisanal production of fishing nets as a context for teaching physical concepts.
such as the strength, traction, and resistance of materials. This approach demonstrates that contextualization
The content can significantly contribute to making teaching more practical and more...
close to the students' reality.

As proposed by Ausubel, these results reinforce the importance of practices.
pedagogical approaches that value students' prior knowledge and aspects of learning.
meaningful. When scientific content is related to students' experiences and life events,
It becomes more possible to establish correlations between scientific knowledge and everyday knowledge.
favoring a broader construction of knowledge (AUSUBEL, 2003)

Another point noted in the analysis of the articles was the unlimited amount of research that
They address the teaching of Physics specifically in rural schools, despite the growing number of
debates about rural education in Brazil; however, there are few studies that investigate
methodologies, resources and practices aimed to the field (ANTUNES-
ROCHA; ALVES; HUNZIKER, 2023). This deficiency highlights the need to rethink and
to expand research and develop proposals that are consistent with local knowledge and contribute
For a more inclusive, contextualized, and dynamic approach to teaching physics.

Therefore, the results of this research reinforce the idea that contextualization of
Scientific content from a rural perspective can significantly contribute to reconciling the
Teaching physics in relation to the reality of students in rural areas. Considering their lifestyles and knowledge.
and cultural practices present in rural areas, it is possible to build a more educational process
connected to the daily lives of students.

Final Considerations

Given the context of the discussions presented, it is noteworthy that the teaching of Physics in the field
It still faces challenges related to a shortage of teaching resources and a lack of contextualization.
The content and teacher training are poorly focused on the reality of students in rural areas. These factors
They favor a distant education for students in rural areas, removed from their daily lives, which makes it difficult to...
meaningful learning.

The research analyzed highlights the convergence between scientific content and...
Rural experiences are fundamental to making education more accessible. By recognizing local knowledge.
and through everyday practices, the educational process becomes more practical and accessible, favoring the
development and understanding of physical concepts by students.

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In this way, the need to expand research focused on physics education in [the context of physics education] is highlighted.
field, considering the limited scientific production in the context of physics teaching in education of
field. Applying contextualized methodologies and offering adequate teacher training are
necessary to promote a more inclusive and quality education.

Therefore, it can be concluded that the teaching of Physics, rethought from the perspective of field reality,
It is not merely a methodological adaptation, but an education that values, transforms, and recognizes.
the reality of the students.

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